

Remarks:

This amendment is submitted in an earnest effort to advance this case to issue without delay.

The specification has been amended to correct some minor obvious errors and to place it in better US form. No new matter whatsoever has been added.

The requirement to amend the drawing has been mooted by canceling the claims to those features of the claims susceptible of illustration, namely claims 26-29. The objection to claim 22 for nonillustration is incorrect since the claimed feature is largely functional and not illustratable.

Claim 15 has been amended by incorporation into it of the subject matter of claims 18, 22, and 23. Thus claim 15 recites how the ribs are made of plastic and form a spring and damping member that prevents complete inversion of the umbrella and that insures automatic restoration of its normal shape when inversion forces are relieved.

In addition claim 15 now recites not a simple "brace" but a "brace strut" and states, as originally recited in the second paragraph of the Summary section of this application that the brace strut can resist both compression and tension. This feature is

important to reinforce the umbrella against collapse from forces from above, not just inversion.

In US 6,750,504 of Chen there is an additional brace 32, here a cable, that works against inversion of the canopy. In US 6,186,157 of Lin there is a similar such brace 4, also a cable.

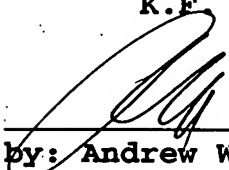
The disadvantage of this system is of course that the umbrella cannot resist forces from above better than an umbrella with no such braces, since the cables cannot resist compression at all and will simply collapse. Furthermore the cable braces of Lin and Chen are not mounted on slides, but on fixed points on the respective ribs. In Lin the anchors 43 are fixed and in the brace anchors are clearly also fixed. Thus claim 15 clearly defines under §102 over these references individually and, since neither suggests a stiff brace with a slide, over both of them together under §103.

Thus the amended claims are clearly allowable over the applied art. Notice to that effect is earnestly solicited.

If only minor problems that could be corrected by means of a telephone conference stand in the way of allowance of this

case, the examiner is invited to call the undersigned to make the necessary corrections.

Respectfully submitted,  
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Enclosure:                      Corrected version  
                                    Substitute Specification



## UMBRELLA

CROSS REFERENCE TO RELATED APPLICATIONS

This application is the US national phase of PCT application PCT/DE2004/000464, filed 9 March 2004, published 30 September 2004 as WO 2004/082419, and claiming the priority of German patent application 20304453.3 itself filed 19 March 2003, all herewith incorporated by reference.

FIELD OF THE INVENTION

The invention relates to an umbrella with a shaft and a frame carried on the shaft and comprised of a spider formed by a plurality of ribs over which is spanned a canopy and by respective spreader struts pivoted on the ribs and on an actuator slidable longitudinally along the shaft.

BACKGROUND OF THE INVENTION

Such umbrellas are well known that with this structure have been widely used for rain protection, and [[which]] that are often used in stormy weather when the rain is accompanied by wind. The canopy provides a good purchase for the wind and thus poses a considerable load for the umbrella frame where the curvature of the ribs and the spreaders are set such that they can resist wind bearing from above on the canopy, which is the normal situation when the umbrella is aimed into rain carried by the wind. There are problems however with gusty and cyclonic wind, where the wind engages the umbrella from below and pushes up on the frame. This creates the possibility that the frame inverts which leaves the user without protection in the rain and which also can lead to irreparable damage to the umbrella frame.

### OBJECT OF THE INVENTION

It is an object of the invention to provide an umbrella of the above-described type where the possibility of inversion of the umbrella frame and its canopy is rendered impossible or at least largely eliminated.

### SUMMARY OF THE INVENTION

This object is attained with an umbrella of the above-described type in at least one brace is pivoted at an inner end on a respective one of the spreaders and at an outer end on a slide that is movable along an outer end region of the respective rib.

Such an umbrella has the advantage that the long free lever arm of the rib between its free end and the pivot between the rib and the outer end of the respective spreader is substantially reduced and the wind forces acting from blow on the open umbrella are better resisted and transmitted to the entire umbrella frame. It is important that with this structure the strength of the umbrella with regard to standard winds from above is increased since the braces resist both tension and compression forces.

It is preferred that a length of the rib between its outer end and its pivotal connection with the respective spreader is at least equal to the length of the respective brace plus the length of the respective spreader between its pivotal connection with the respective rib and with the respective brace. This construction ensures that the umbrella is of small size, in particular with respect to diameter, when closed.

It is further preferable within the scope of the invention when a plurality of the braces are distributed angularly extending between the spreaders and the ribs, since in this manner

the user of the umbrella does not have to pay attention that the most heavily stressed part of the umbrella be oriented upward with the reinforced wind protection set to prevent inversion of the canopy.

5           It is preferred in the scope of the invention that the ribs be comprised of plastic and that in open condition a tension of the canopy on the elastically bent ribs and on the braces is such that only a sectoral inversion of the frame with the canopy is possible and a complete inversion of the canopy is inhibited  
10 circumferentially. Making the ribs as plastic bars has with regard to metallic profiled ribs the substantial advantage that even after an inversion caused by a powerful gust, there is no irreversible deformation of the ribs, but the umbrella can be restored to its normal use condition.

15           It has shown advantageous when the plastic spreaders have a diameter of 2 to 6 mm, preferably 3 to 4 mm, since the small diameters gives sufficient strength without adding unnecessarily to the weight of the umbrella.

20           It is further preferred that the braces be made of plastic, to be able to have further good strength with light weight. In addition this also works against irreversible deformation.

25           The resistance of the umbrella to wind force is increased when in open condition the spider with the canopy and frame form a spring element acting as a damping member that resists inversion.

          Usability is further improved when the spring strength of the damping member is such that only a sectoral inversion is possible and that it forces an automatic restoration by the damping

member when wind pressure drops. The user does not have to actually do something himself or herself in order to restore the umbrella to original noninverted condition, something that is fairly difficult with prior-art umbrellas since when completely inverted the umbrella is again a stable structure that is difficult to deal with in the rain and where the user must use his or her hands to overcome the reversed tension in the canopy.

It is only necessary in umbrellas intended to be very large that every rib has a brace, so that for weight reasons it is preferred that every other spreader have one such brace.

In order to ensure a smooth and spontaneous sliding of the ~~sliders~~ slides on the ribs, the invention provides that the slides are each formed by a tube engaged around the respective rib and formed with a nose in turn forming the pivot.

Alternatively it is possible that the rib of each brace has at least where it engages the respective brace a U-section in which a shoe carried by the respective slide can shift. When the diameter of the brace is smaller than the interior width of the U-section it is possible to ~~[[next]]~~ nest the brace in the rib when the umbrella is closed.

When the ribs have braces each having an abutment for limiting sliding of the respective slide toward the shaft, the umbrella is even more resistant to wind from below the frame, since the rib cannot shift further in the opening direction because of the slide.

It is particularly preferred that the abutment is mounted on the respective rib at a spacing from its outer end that is effective via the respective brace to curve the respective rib so

as to prestress the frame when open in a direction resisting inversion since in this manner the force and the necessary wind strength is increased that is necessary to invert the umbrella frame.

5                    BRIEF DESCRIPTION OF THE DRAWING

In the following the invention is described with reference to an embodiment shown in the drawing; therein:

FIG. 1 is a perspective view of the umbrella according to the invention in opened condition; and

10                   FIG. 2 is the umbrella of FIG. 1 in closed condition.

SPECIFIC DESCRIPTION

An umbrella 1 shown in FIG. 1 is formed by a shaft 2 and a frame 3 carried on the shaft 2 and formed by a plurality of ribs 4 carrying a canopy 5 formed by spreader struts 6 that are pivoted on the respective ribs 4 and on a slidable actuator 7 movable longitudinally on the shaft 2. Pivoted on at least one, in this embodiment every second, rib 6 there is an additional brace strut 8 that carries on one end, here the outer end, a slide 9 that is longitudinally slidable on the respective rib 4. The length of each rib 4 between its outer end and its pivotal connection with the respective spreader 6 is at least equal to the length of the respective brace 8 plus the length of the respective spreader 6 between its pivotal connection with the respective rib 4 and with the respective brace 8.

25                   The ribs 4 and the braces 8 are made of plastic so that when open the tension is determined by the bending elasticity of the ribs 4 and the braces 8 so that only a sectoral inversion of the frame 3 with the canopy 5 is possible and a complete inversion



of the canopy 5 is not possible. The plastic ribs and spreaders have a diameter of 2 to 6 mm, preferably 3 to 4 mm.

It is further important that the frame 3 with the canopy 5 in the opened condition form a resilient assembly with damping action that inhibits inversion and where the spring strength of the damping element is such that only a localized sectoral inversion is possible and that the tensioned damping element effects automatic restoration when wind pressure drops.

In the embodiment shown in the drawing the slides 9 are formed as tubes gripping the respective ribs and having noses forming the pivotal connection. An alternative embodiment not shown in the drawing is that each rib 4 is formed where it engages the respective brace 8 of U-section and holds a slide shoe of the respective brace 8 [[so]] and that the diameter of the brace 8 is smaller than the interior width of the U-section.

The ribs 4 having braces 8 each have an abutment for limiting the travel of the respective slide 9 toward the shaft 2. Thus according to a further unillustrated embodiment, the abutment is provided on the rib 4 at a spacing from its outer end that effects via the respective brace 8 a bending of the respective rib 4 toward the open position of the frame 3 so as to be effective opposite to any inversion forces in order that the strength of the frame 3 is further increased and a spring element is employed as damper.